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EAST LOON LAKE, LAKE COUNTY, ILLINOIS

Pacific Northwest Environmental Research Laboratory

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U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL EUTROPHICATION SURVEY

WORKING PAPER SERIES

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REPORT

ON

EAST LOON LAKE

LAKE COUNTY

ILLINOIS

EPA REGION V

WORKING PAPER No. 304

WITH THE COOPERATION OF THE

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY

AND THE

ILLINOIS NATIONAL GUARD

JUNE, 1975

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16. ABSTRACT
Annual total phosphorus and total nitrogen loadings to the lake were estimated and subdivided according to either point or non-point source origin. An assessment of the lake's trophic condition and limiting nutrient is also provided. All data collected by the U.S.E.P.A. National Eutrophication Survey during the one year study of the lake and its tributaries are included in the report.

17. KEY WORDS AND DOCUMENT ANALYSIS

a. DESCRIPTORS	b. IDENTIFIERS/OPEN ENDED TERMS	c. COSATI Field/Group
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FOREWORD

The National Eutrophication Survey was initiated in 1972 in response to an Administration commitment to investigate the nationwide threat of accelerated eutrophication to fresh water lakes and reservoirs.

OBJECTIVES

The Survey was designed to develop, in conjunction with state environmental agencies, information on nutrient sources, concentrations, and impact on selected freshwater lakes as a basis for formulating comprehensive and coordinated national, regional, and state management practices relating to point-source discharge reduction and non-point source pollution abatement in lake watersheds.

ANALYTIC APPROACH

The mathematical and statistical procedures selected for the Survey's eutrophication analysis are based on related concepts that:

a. A generalized representation or model relating sources, concentrations, and impacts can be constructed.

b. By applying measurements of relevant parameters associated with lake degradation, the generalized model can be transformed into an operational representation of a lake, its drainage basin, and related nutrients.

c. With such a transformation, an assessment of the potential for eutrophication control can be made.

LAKE ANALYSIS

In this report, the first stage of evaluation of lake and watershed data collected from the study lake and its drainage basin is documented. The report is formatted to provide state environmental agencies with specific information for basin planning [§303(e)], water quality criteria/standards review [§303(c)], clean lakes [§314(a,b)], and water quality monitoring [§106 and §305(b)] activities mandated by the Federal Water Pollution Control Act Amendments of 1972.

Beyond the single lake analysis, broader based correlations between nutrient concentrations (and loading) and trophic condition are being made to advance the rationale and data base for refinement of nutrient water quality criteria for the Nation's fresh water lakes. Likewise, multivariate evaluations for the relationships between land use, nutrient export, and trophic condition, by lake class or use, are being developed to assist in the formulation of planning guidelines and policies by EPA and to augment plans implementation by the states.

ACKNOWLEDGMENT

The staff of the National Eutrophication Survey (Office of Research & Development, U. S. Environmental Protection Agency) expresses sincere appreciation to the Illinois Environmental Protection Agency for professional involvement and to the Illinois National Guard for conducting the tributary sampling phase of the Survey.

Dr. Richard H. Briceland, Director of the Illinois Environmental Protection Agency; and Ronald M. Barganz, State Survey Coordinator, and John J. Forneris, Manager of Region III, Field Operations Section of the Division of Water Pollution Control, provided invaluable lake documentation and counsel during the Survey, reviewed the preliminary reports, and provided critiques most useful in the preparation of this Working Paper series.

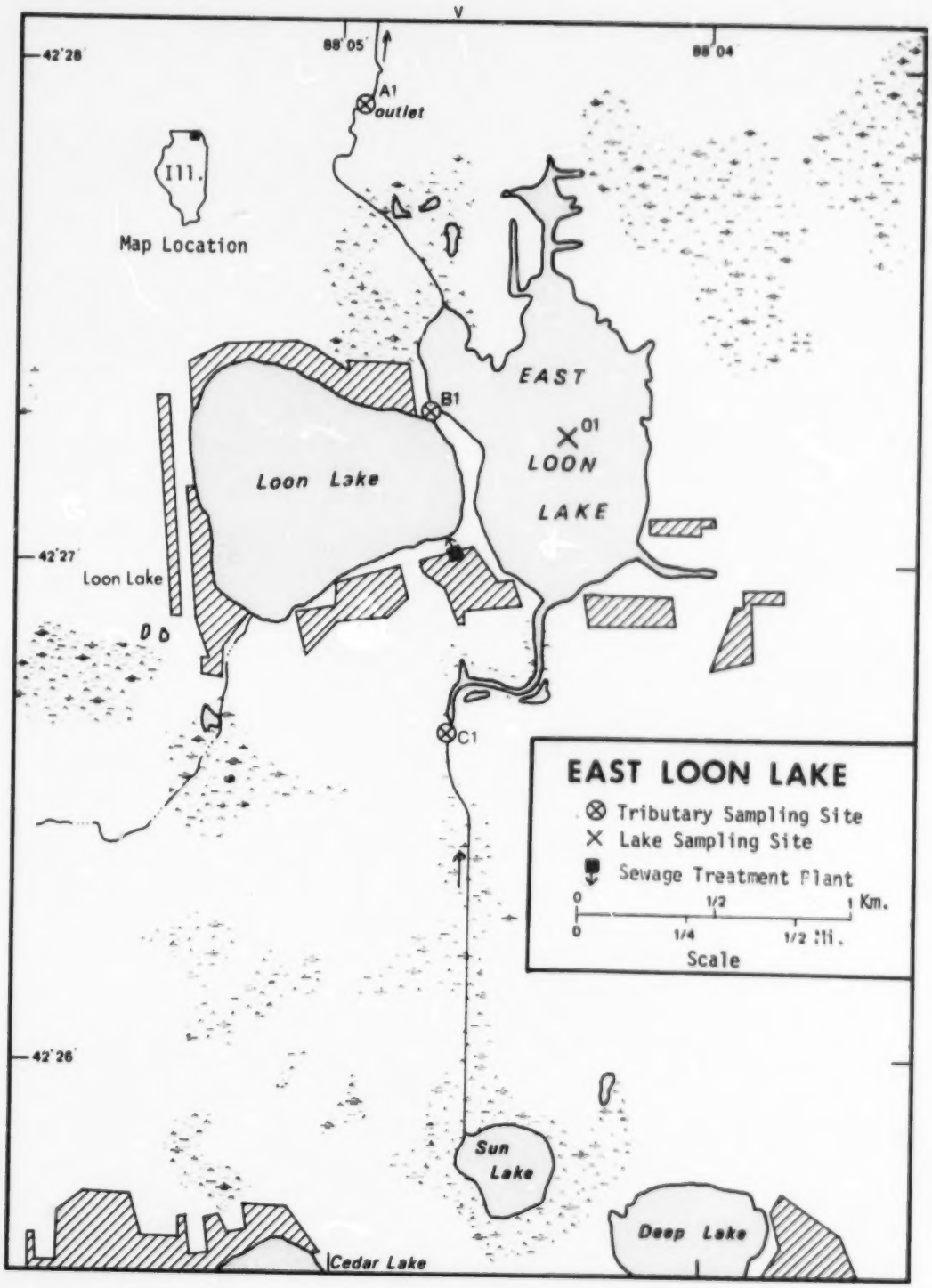
Major General Harold R. Patton, the Adjutant General of Illinois, and Project Officer Colonel Daniel L. Fane, who directed the volunteer efforts of the Illinois National Guardsmen, are also gratefully acknowledged for their assistance to the Survey.

NATIONAL EUTROPHICATION SURVEY

STUDY LAKES

STATE OF ILLINOIS

LAKE NAME	COUNTY
Baldwin	Randolph
Bloomington	McLean
Carlyle	Bond, Clinton, Fayette
Cedar	Lake
Charleston	Coles
Coffeen	Montgomery
Crab Orchard	Jackson, Williamson
Decatur	Macon
DePue	Bureau
East Loon	Lake
Fox	Lake
Grass	Lake
Highland Silver	Madison
Holiday	LaSalle
Horseshoe	Madison
Long	Lake
Lou Yaeger	Montgomery
Marie	Lake
Old Ben Mine	Franklin
Pistakee	Lake, McHenry
Raccoon	Marion
Rend	Franklin, Jefferson
Sangchris	Christian
Shelbyville	Moultrie, Shelby
Slocum	Lake
Springfield	Sangamon
Storey	Knox
Vandalia	Fayette
Vermilion	Vermilion
Wee-Ma-Tuk	Fulton
Wonder	McHenry


42°28'
88°05'
88°04'
A1
outlet
Ill.
Map Location
EAST
LOON
LAKE
B1
01
Loon Lake
42°27'
Loon Lake
C1
EAST LOON LAKE
Tributary Sampling Site
Lake Sampling Site
Sewage Treatment Plant
0
1/2
1 Km.
0
1/4
1/2 Mi.
Scale
42°26'
Sun
Lake
Deep Lake
Cedar Lake

EAST LOON LAKE

STORET NO. 1757

I. INTRODUCTION

Because of the lack of gradient and the diffuse drainage through the marsh areas around East Loon Lake, the U.S. Geological Survey could not provide flow data for the tributaries to the lake. For this reason, it is not possible to determine the overall nutrient loadings to the lake. Only one known point source indirectly impacts the lake. Therefore, this report primarily relates to lake sampling data, although all of the data obtained during the Survey are included in the appendices.

II. CONCLUSIONS

A. Trophic Condition:

Survey data indicate that East Loon Lake is eutrophic. Based on an index of six water quality parameters, East Loon Lake ranked fifth in overall trophic quality among the 31 Illinois water bodies sampled in 1973*. Nine of the lakes had less median total phosphorus, six had less and one had the same median dissolved phosphorus, none had less median inorganic nitrogen, 14 had less mean chlorophyll a, and only one lake had a greater mean Secchi disc transparency. Depletion of dissolved oxygen with depth occurred in August, 1973.

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* See Appendix A.

Survey limnologists noted that macrophytes occupied about 60% of the shoreline shallows and reported a blue-green algal bloom in October.

B. Rate-Limiting Nutrient:

A differential change in primary nutrients occurred in the assay sample between the time of collection and the beginning of the assay, and the results are not representative of conditions in the lake at the time the sample was taken. However, the lake data indicate nitrogen limitation at all sampling times.

C. Nutrient Sources:

It is estimated that the Moody Youth Camp contributed 45 kg of total phosphorus and 140 kg of total nitrogen to Loon Lake during the sampling year. If it is assumed that no sedimentation or biological assimilation occurred in Loon Lake, the point-source loading rate to East Loon Lake would be only 0.07 $g/m^2/yr$. Therefore, it does not seem likely that the Moody Youth Camp contributes significantly to the phosphorus load to East Loon Lake.

As noted above, tributary flow data are not available, and non-point nutrient loads cannot be calculated.

III. LAKE AND DRAINAGE BASIN CHARACTERISTICS†

A. Lake Morphometry††:

1. Surface area: 0.67 kilometers^2.
2. Mean depth: 1.8 meters.
3. Maximum depth: >6.4 meters.
4. Volume: 1.229×10^6 m^3.
5. Mean hydraulic retention time: 89 days (based on outflow).

B. Tributary and Outlet:
(See Appendix C for flow data)

1. Tributaries -

Name	Drainage area (km^2)*	Mean flow (m^3/sec)*
None measured or gaged		

2. Outlet -

Unnamed Stream (A-1)	25.9**	0.16

C. Precipitation***:

1. Year of sampling: 112.2 centimeters.
2. Mean annual: 83.3 centimeters.

---

† Table of metric conversions--Appendix B.
†† Forneris, 1973.
* For limits of accuracy, see Working Paper No. 175, "...Survey Methods, 1973-1976".
** Includes area of lake.
*** See Working Paper No. 175.

IV. LAKE WATER QUALITY SUMMARY

East Loon Lake was sampled three times during the open-water season of 1973 by means of a pontoon-equipped Huey helicopter. Each time, samples for physical and chemical parameters were collected from a number of depths at a single station on the lake (see map, page v). During each visit, a single depth-integrated (4.6 m to surface) sample was collected for phytoplankton identification and enumeration; and a similar sample was collected for chlorophyll a analysis. During the first visit, a single 18.9-liter depth-integrated sample was taken for algal assays. The maximum depth sampled was 6.4 meters.

The sampling results are presented in full in Appendix D and are summarized in the following table.

A. SUMMARY OF PHYSICAL AND CHEMICAL CHARACTERISTICS FOR EAST LOON LAKE
STORET CODE 1757

PARAMETER	1ST SAMPLING (5/ 9/73) 1 SITES RANGE	MEAN	MEDIAN	2ND SAMPLING (8/ 7/73) 1 SITES RANGE	MEAN	MEDIAN	3RD SAMPLING (10/16/73) 1 SITES RANGE	MEAN	MEDIAN
TEMP (C)	13.9 - 14.0	13.9	13.9	14.8 - 25.7	21.4	23.2	16.0 - 16.0	16.0	16.0
DISS OXY (MG/L)	9.8 - 9.9	9.8	9.8	0.0 - 6.8	3.3	3.2	8.6 - 8.6	8.6	8.6
CNDCTVY (MCROMO)	465. - 480.	472.	470.	442. - 499.	475.	483.	354. - 355.	354.	354.
PH (STAND UNITS)	8.2 - 8.3	8.3	8.3	7.2 - 8.6	7.9	8.0	8.6 - 8.6	8.6	8.6
TOT ALK (MG/L)	173. - 174.	174.	174.	171. - 200.	179.	173.	165. - 167.	166.	166.
TOT P (MG/L)	0.047 - 0.049	0.048	0.048	0.036 - 0.396	0.154	0.092	0.085 - 0.089	0.087	0.088
ORTHO P (MG/L)	0.016 - 0.019	0.017	0.017	0.011 - 0.317	0.101	0.037	0.018 - 0.036	0.027	0.026
NO2+NO3 (MG/L)	0.060 - 0.070	0.067	0.070	0.060 - 0.160	0.122	0.135	0.020 - 0.030	0.027	0.030
AMMONIA (MG/L)	0.050 - 0.060	0.053	0.050	0.060 - 2.090	0.697	0.320	0.050 - 0.060	0.053	0.050
KJEL N (MG/L)	0.900 - 1.200	1.033	1.000	1.400 - 3.200	2.025	1.750	1.300 - 1.600	1.433	1.400
INORG N (MG/L)	0.110 - 0.130	0.120	0.120	0.120 - 2.240	0.820	0.460	0.070 - 0.090	0.080	0.080
TOTAL N (MG/L)	0.960 - 1.270	1.100	1.070	1.460 - 3.350	2.147	1.890	1.320 - 1.630	1.460	1.430
CHLRPYL A (UG/L)	12.1 - 12.1	12.1	12.1	28.0 - 28.0	28.0	28.0	26.8 - 26.8	26.8	26.8
SECCHI (METERS)	1.5 - 1.5	1.5	1.5	1.4 - 1.4	1.4	1.4	0.9 - 0.9	0.9	0.9

B. Biological characteristics:

1. Phytoplankton -

Sampling Date	Dominant Genera	Algal units per ml
05/09/73	1. Dinobryon sp.	1,108
	2. Flagellates	1,041
	3. Fragilaria sp.	860
	4. Anabaena sp.	588
	5. Cryptomonas sp.	271
	Other genera	951
	Total	4,819
08/07/73	1. Lyngbya sp.	3,981
	2. Arthrospira sp.	1,175
	3. Merismopedia sp.	682
	4. Microcystis sp.	492
	5. Oscillatoria sp.	417
	Other genera	3,110
	Total	9,857
10/16/73	1. Aphanizomenon sp.	2,110
	2. Melosira sp.	361
	3. Microcystis sp.	216
	4. Gomphosphaeria sp.	180
	5. Cryptomonas sp.	108
	Other genera	669
	Total	3,644

2. Chlorophyll a -

Sampling Date	Station Number	Chlorophyll a (µg/l)
05/09/73	01	12.1
08/07/73	01	28.0
10/16/73	01	26.8

C. Limiting Nutrient Study:

A differential change in phosphorus and nitrogen occurred in the assay sample between the time of collection and the beginning of the assay, and the limiting nutrient shifted from nitrogen in the lake (N/P = 7/1) to phosphorus in the sample (N/P = 16/1). Consequently, the assay results are not indicative of conditions in the lake at the time the sample was collected.

The lake data indicate nitrogen limitation at all sampling times. The mean inorganic nitrogen to orthophosphorus ratios were 8 to 1 or less, and nitrogen limitation would be expected.

V. NUTRIENT LOADINGS
(See Appendix E for data)

For the determination of nutrient concentrations, the Illinois National Guard collected monthly near-surface grab samples from each of the tributary sites indicated on the map (page v), except for the high runoff months of March and April when two samples were collected. Sampling was begun in June, 1973, and was completed in April, 1974.

Through an interagency agreement, outlet flow estimates for the year of sampling and a "normalized" or average year were provided by the Illinois District Office of the U.S. Geological Survey. However, flows could not be determined for the tributaries (see page 1).

The Moody Youth Camp did not participate in the Survey, and nutrient loads were estimated at 1.134 kg P and 3.401 kg N/capita/year.

A. Waste Source*:

Name	Pop. Served	Treatment	Mean Flow (m^3/d)	Receiving Water
Moody Youth Camp	100	sand filter	37.8**	Loon Lake to East Loon Lake

* Barganz, 1975 (camp is operational about five months per year).
** Estimated at 0.3785 m^3/capita/day.

VI. LITERATURE REVIEWED

Barganz, Ronald M., 1975. Personal communication (Moody Youth Camp wastewater treatment facilities). IL Env. Prot. Agency, Springfield.

Forneris, John J., 1973. Personal communication (lake morphometry). IL Env. Prot. Agency, Springfield.

VII. APPENDICES

APPENDIX A

LAKE RANKINGS

LAKE DATA TO BE USED IN RANKINGS

LAKE CODE	LAKE NAME	MEDIAN TOTAL P	MEDIAN INORG N	500-MEAN SEC	MEAN CHLORA	15-MIN DO	MEDIAN DISS ORTHO P
1703	LAKE BLOOMINGTON	0.050	5.730	464.667	26.200	14.000	0.020
1706	LAKE CARLYLE	0.084	1.270	477.889	17.367	11.000	0.032
1708	LAKE CHARLESTON	0.160	4.680	490.667	12.800	8.400	0.065
1711	COFFEEN LAKE	0.032	0.260	456.222	7.700	14.900	0.012
1712	CRAB ORCHARD LAKE	0.082	0.200	482.222	59.867	13.800	0.013
1714	LAKE DECATUR	0.129	3.750	479.571	43.800	14.500	0.062
1725	LONG LAKE	0.704	1.190	482.667	49.333	8.000	0.398
1726	LAKE LOU YAEGER	0.186	1.680	489.583	10.662	11.400	0.076
1727	LAKE MARIE	0.098	0.370	467.667	39.533	14.700	0.057
1733	PISTAKEE LAKE	0.203	0.370	485.667	75.867	7.000	0.062
1735	REND LAKE	0.071	0.210	471.500	23.533	12.700	0.012
1739	LAKE SHELBYVILLE	0.062	3.290	461.333	17.161	14.800	0.019
1740	SILVER LAKE (HIGHLAND)	0.226	0.970	489.500	5.822	14.000	0.057
1742	LAKE SPRINGFIELD	0.108	3.265	483.385	13.813	10.000	0.050
1748	VERMILION LAKE	0.109	4.695	481.500	33.150	14.200	0.050
1750	WONDER LAKE	0.426	0.890	486.000	98.533	7.000	0.132
1751	LAKE STORY	0.072	2.510	459.333	17.250	14.000	0.021
1752	DEPUE LAKE	0.438	4.050	490.000	58.833	7.600	0.276
1753	LAKE SANGCHRIS	0.050	1.970	475.417	19.292	14.500	0.009
1754	LAKE HOLIDAY	0.167	3.135	485.167	51.217	7.200	0.046
1755	FOX LAKE	0.219	0.375	486.167	63.850	8.000	0.083
1756	GRASS LAKE	0.301	0.820	481.000	83.500	5.900	0.093
1757	EAST LOON LAKE	0.076	0.120	450.000	22.300	14.900	0.010
1758	SLOCUM LAKE	0.865	0.200	487.333	221.100	5.000	0.362
1759	CEDAR LAKE	0.029	0.170	480.333	5.767	12.000	0.013
1761	LAKE WEMATUK	0.069	1.770	466.333	7.967	14.500	0.031
1762	RACCOON LAKE	0.106	0.310	484.333	19.217	13.000	0.020
1763	BALDWIN LAKE	0.044	0.140	461.167	11.333	13.200	0.007

LAKE DATA TO BE USED IN RANKINGS

LAKE CODE	LAKE NAME	MEDIAN TOTAL P	MEDIAN INORG N	500-MEAN SEC	MEAN CHLORA	15-MIN DO	MEDIAN DISS ORTHO P
1764	LAKE VANDALIA	0.116	0.480	478.111	11.276	14.800	0.023
1765	OLD BEN MINE RESERVOIR	0.930	0.205	478.333	31.433	11.200	0.575
1766	HORSESHOE LAKE	0.127	0.705	482.833	182.250	6.800	0.018

PERCENT OF LAKES WITH HIGHER VALUES (NUMBER OF LAKES WITH HIGHER VALUES)

LAKE CODE	LAKE NAME	MEDIAN TOTAL P	MEDIAN INORG N	500-MEAN SEC	MEAN CHLORA	15-MIN DO	MEDIAN DISS ORTHO P	INDEX NO
1703	LAKE BLOOMINGTON	88 (26)	0 (0)	80 (24)	47 (14)	13 (2)	68 (20)	296
1706	LAKE CARLYLE	63 (19)	40 (12)	63 (19)	63 (19)	63 (19)	53 (16)	345
1708	LAKE CHARLESTON	37 (11)	7 (2)	0 (0)	77 (23)	77 (23)	27 (8)	225
1711	COFFEEN LAKE	97 (29)	77 (23)	93 (28)	93 (28)	2 (0)	92 (27)	454
1712	CRAB ORCHARD LAKE	67 (20)	90 (27)	43 (13)	20 (6)	42 (12)	85 (25)	347
1714	LAKE DECATUR	40 (12)	13 (4)	53 (16)	33 (10)	30 (8)	32 (9)	201
1725	LONG LAKE	7 (2)	43 (13)	40 (12)	30 (9)	72 (21)	3 (1)	195
1726	LAKE LOU YAEGER	30 (9)	37 (11)	7 (2)	87 (26)	57 (17)	23 (7)	241
1727	LAKE MARIE	60 (18)	68 (20)	73 (22)	37 (11)	23 (7)	42 (12)	303
1733	PISTAKEE LAKE	27 (8)	68 (20)	23 (7)	13 (4)	90 (27)	32 (9)	253
1735	REND LAKE	77 (23)	80 (24)	70 (21)	50 (15)	53 (16)	92 (27)	422
1739	LAKE SHELBYVILLE	83 (25)	17 (5)	83 (25)	70 (21)	13 (2)	73 (22)	339
1740	SILVER LAKE (HIGHLAND)	20 (6)	47 (14)	10 (3)	97 (29)	13 (2)	42 (12)	229
1742	LAKE SPRINGFIELD	53 (16)	20 (6)	33 (10)	73 (22)	67 (20)	37 (11)	283
1748	VERMILION LAKE	50 (15)	3 (1)	47 (14)	43 (13)	37 (11)	47 (14)	227
1750	WONDER LAKE	13 (4)	50 (15)	20 (6)	7 (2)	80 (24)	13 (4)	183
1751	LAKE STORY	73 (22)	27 (8)	90 (27)	67 (20)	13 (2)	63 (19)	333
1752	DEPUE LAKE	10 (3)	10 (3)	3 (1)	23 (7)	83 (25)	10 (3)	139
1753	LAKE SANGCHRIS	88 (26)	30 (9)	67 (20)	57 (17)	30 (8)	97 (29)	369
1754	LAKE HOLIDAY	33 (10)	23 (7)	27 (8)	27 (8)	87 (26)	50 (15)	247
1755	FOX LAKE	23 (7)	63 (19)	17 (5)	17 (5)	72 (21)	20 (6)	212
1756	GRASS LAKE	17 (5)	53 (16)	50 (15)	10 (3)	97 (29)	17 (5)	244
1757	EAST LOON LAKE	70 (21)	100 (30)	97 (29)	53 (16)	2 (0)	77 (23)	399
1758	SLOCUM LAKE	3 (1)	87 (26)	13 (4)	0 (0)	100 (30)	7 (2)	210
1759	CEDAR LAKE	100 (30)	93 (28)	100 (30)	100 (30)	50 (15)	85 (25)	528
1761	LAKE WEMATUK	80 (24)	33 (10)	77 (23)	90 (27)	30 (8)	57 (17)	367
1762	RACCOON LAKE	57 (17)	73 (22)	30 (9)	60 (18)	42 (12)	68 (20)	330
1763	BALDWIN LAKE	93 (28)	97 (29)	87 (26)	80 (24)	47 (14)	100 (30)	504

PERCENT OF LAKES WITH HIGHER VALUES (NUMBER OF LAKES WITH HIGHER VALUES)

LAKE CODE	LAKE NAME	MEDIAN TOTAL P	MEDIAN INORG N	500-MEAN SEC	MEAN CHLORA	1S-MIN DO	MEDIAN DISS ORTHO P	INDEX NO
1764	LAKE VANDALIA	47 (14)	60 (18)	60 (18)	83 (25)	13 (2)	60 (18)	323
1765	OLD BEN MINE RESERVOIR	0 (0)	83 (25)	57 (17)	40 (12)	60 (18)	0 (0)	240
1766	HORSESHOE LAKE	43 (13)	57 (17)	37 (11)	3 (1)	93 (28)	80 (24)	313

LAKES RANKED BY INDEX NOS.

RANK	LAKE CODE	LAKE NAME	INDEX NO
1	1759	CEDAR LAKE	528
2	1763	BALDWIN LAKE	504
3	1711	COFFEEN LAKE	454
4	1735	REND LAKE	422
5	1757	EAST LOON LAKE	399
6	1753	LAKE SANGCHRIS	369
7	1761	LAKE WEMATUK	367
8	1712	CRAB ORCHARD LAKE	347
9	1706	LAKE CARLYLE	345
10	1739	LAKE SHELBYVILLE	339
11	1751	LAKE STORY	333
12	1762	RACCOON LAKE	330
13	1764	LAKE VANDALIA	323
14	1766	HORSESHOE LAKE	313
15	1727	LAKE MARIE	303
16	1703	LAKE BLOOMINGTON	296
17	1742	LAKE SPRINGFIELD	283
18	1733	PISTAKEE LAKE	253
19	1754	LAKE HOLIDAY	247
20	1756	GRASS LAKE	244
21	1726	LAKE LOU YAEGER	241
22	1765	OLD BEN MINE RESERVOIR	240
23	1740	SILVER LAKE (HIGHLAND)	229
24	1748	VERMILION LAKE	227
25	1708	LAKE CHARLESTON	225
26	1755	FOX LAKE	212
27	1758	SLOCUM LAKE	210
28	1714	LAKE DECATUR	201

LAKES RANKED BY INDEX NOS.

RANK	LAKE CODE	LAKE NAME	INDEX NO
29	1725	LONG LAKE	195
30	1750	WONDER LAKE	183
31	1752	DEPUE LAKE	139

APPENDIX B

CONVERSIONS FACTORS

CONVERSION FACTORS

Hectares x 2.471 = acres

Kilometers x 0.6214 = miles

Meters x 3.281 = feet

Cubic meters x 8.107×10^{-4} = acre/feet

Square kilometers x 0.3861 = square miles

Cubic meters/sec x 35.315 = cubic feet/sec

Centimeters x 0.3937 = inches

Kilograms x 2.205 = pounds

Kilograms/square kilometer x 5.711 = lbs/square mile

APPENDIX C

TRIBUTARY FLOW DATA

TRIBUTARY FLOW INFORMATION FOR ILLINOIS 10/23/75

LAKE CODE 1757 EAST LOON LAKE

TOTAL DRAINAGE AREA OF LAKE(SQ KM) 25.9

TRIBUTARY	SUB-DRAINAGE AREA(SQ KM)	NORMALIZED FLOWS(CMS) JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	MEAN
1757A1	25.9	0.16	0.25	0.31	0.31	0.24	0.21	0.12	0.06	0.04	0.04	0.07	0.08	0.16
1757ZZ	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

SUMMARY

TOTAL DRAINAGE AREA OF LAKE = 25.9
SUM OF SUB-DRAINAGE AREAS = 0.0

TOTAL FLOW IN = 0.0
TOTAL FLOW OUT = 1.91

NOTE *** PART OF FOX CHAIN OF LAKES

MEAN MONTHLY FLOWS AND DAILY FLOWS(CMS)

TRIBUTARY	MONTH	YEAR	MEAN FLOW	DAY	FLOW	DAY	FLOW	DAY	FLOW
1757A1	6	73	0.07	2	0.07				
	7	73	0.03	7	0.07				
	8	73	0.02	18	0.01				
	9	73	0.03	9	0.02				
	10	73	0.04	14	0.07				
	11	73	0.04	4	0.04				
	12	73	0.07	2	0.03				
	1	74	0.08	6	0.03				
	2	74	0.08	10	0.07				
	3	74	0.09	18	0.07	24	0.05		
	4	74	0.10	3	0.08	30	0.14		

APPENDIX D

PHYSICAL and CHEMICAL DATA

STORET RETRIEVAL DATE 75/10/23

175701
42 27 18.0 088 04 25.0
EAST LOON LAKE
17097 ILLINOIS

11EPALES
3

2111202
0018 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CNDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CACO3 MG/L	00610 NH3-N TOTAL MG/L	00625 TOT KJEL N MG/L	00630 NO2&NO3 N-TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P
73/05/09	14	20 0000	14.0		60	480	8.20	174	0.060	1.200	0.070	0.016
	14	20 0006	13.9	9.9		470	8.30	173	0.050	0.900	0.060	0.017
	14	20 0014	13.9	9.8		465	8.30	174	0.050	1.000	0.070	0.019
73/08/07	11	55 0000	25.6	6.8	54	499	8.60	171	0.130	1.700	0.120	0.011
	11	55 0005	25.7			498						
	11	55 0008	25.6	6.3		494	8.50	171	0.060	1.400	0.060	0.014
	11	55 0010	23.2			483						
	11	55 0015	19.8	0.1		464	7.50	175	0.510	1.800	0.160	0.061
	11	55 0020	14.9			442						
	11	55 0021	14.8	0.0		443	7.20	200	2.090	3.200	0.150	0.317
73/10/16	15	15 0000	16.0		36	354	8.60	167	0.050	1.600	0.030	0.026
	15	15 0005	16.0	8.6		355	8.60	165	0.050	1.300	0.020	0.018
	15	15 0015	16.0	8.6		354	8.60	166	0.060	1.400	0.030	0.036

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL A UG/L
73/05/09	14	20 0000	0.047	12.1
	14	20 0006	0.048	
	14	20 0014	0.049	
73/08/07	11	55 0000	0.036	28.0
	11	55 0008	0.068	
	11	55 0015	0.116	
	11	55 0021	0.396	
73/10/16	15	15 0000	0.089	26.8
	15	15 0005	0.085	
	15	15 0015	0.088	

APPENDIX E

TRIBUTARY DATA

STORET RETRIEVAL DATE 75/10/23

1757A1
42 27 52.0 088 04 55.0
UNNAMED STREAM
17097 7.5 ANTIOCH
O/E LOON LAKE
BRDG ON GRIMM RD .75 MI SE OF ANTIOCH
11EPALES 2111204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/06/02	15 15		0.036	2.100	0.052	0.035	0.075
73/07/07	10 20		0.032	2.700	0.078	0.034	0.095
73/08/18	11 30			2.700	0.130	0.039	0.085
73/09/09	14 50		0.019	7.700	0.154	0.034	0.080
73/10/14	12 00		0.035	1.300	0.044	0.025	0.095
73/12/02	11 15		0.124	2.800	0.140	0.016	0.045
74/01/06	13 30		0.252	2.300	0.400	0.016	0.030
74/02/10			0.740	1.400	0.165	0.045	0.105
74/03/18	12 00		0.330	3.500	0.080	0.005	0.035
74/03/24			0.252	3.000	0.185	0.015	0.045
74/04/03	13 45		0.140	1.200	0.030	0.005	0.020
74/04/30	07 50		0.168	1.400	0.040	0.050	0.110

STORET RETRIEVAL DATE 75/10/23

175781
42 27 15.0 088 04 45.0
LOON/E LOON LK CONNECTION
17 7.5 ANTIOCH
T/E LOON LAKE
BANK BETWEEN LKS AT END OF N PENINSULA
11EPALES 2111204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/06/02	14 50		0.014	2.850	0.063	0.007	0.025
73/07/07	10 05		0.010K	1.200	0.017	0.007	0.020
73/08/18	11 10			2.200	0.069	0.014	0.030
73/09/09	14 45		0.021	6.800	0.220	0.011	0.040
73/10/14	13 20		0.011	0.750	0.028	0.007	0.030
73/11/04	13 10		0.030	1.300	0.138	0.006	0.030
73/12/02	13 30		0.104	2.200	0.088	0.008	0.025
74/01/06	15 00		0.176	0.900	0.064	0.008	0.020
74/02/10			0.550	1.700	0.115	0.020	0.060
74/03/18	12 03		0.288	3.600	0.125	0.010	0.040
74/03/24			0.200	1.500	0.210	0.045	0.095
74/04/03	13 30		0.208	1.400	0.025	0.005K	0.005K
74/04/30	06 35		0.200	1.100	0.025	0.025	0.085

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 75/10/23

1757C1
42 26 40.0 088 04 40.0
UNNAMED STREAM
17 7.5 ANTIOCH
T/E LOON LAKE
BRDG ON LOON LK RD .5 MI ESE OF LOON LK
11EPALES 2111204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/06/02	14 05		0.147	3.200	0.120	0.115	0.175
73/07/07	10 00		0.032	4.050	0.160	0.147	0.710
73/08/18	11 00		0.540	6.800	0.540	0.173	1.050
73/09/09			2.000		3.100	0.385	2.750
73/10/14	12 59		0.250	1.750	0.042	0.025	0.070
73/11/04	13 20		0.890	1.200	0.060	0.009	0.035
73/12/02			0.840	1.300	0.028	0.008	0.020
74/01/06	15 16		1.010	1.000	0.184	0.012	0.025
74/02/10			0.740	6.850	0.155	0.082	0.855
74/03/18	14 01		0.340	3.500	0.090	0.010	0.045
74/03/24			0.840	2.700	0.390	0.040	0.175
74/04/03	13 00		0.360	1.700	0.045	0.015	0.055
74/04/30	06 30		0.360	1.100	0.040	0.015	0.065